SiXton's Curse – Simulator X Demonstration

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1 Introduction

We present *SiXton's Curse*–a computer game–to illustrate the benefits of a novel simulation platform. Simulator X [2] targets virtual, augmented, and mixed reality applications as well as computer games. The game simulates a medieval village called SiXton that can be explored and experienced using gestures and speech for input. *SiXton's Curse* utilizes multiple independent components for physical simulation, sound and graphics rendering, artificial intelligence, as well as for multi-modal interaction (MMI). The components are already an integral part of Simulator X's current version.

Building on Hewitt's actor model [1], the Simulator X platform enables the developer to easily exploit the capabilities of modern hardware architectures. A state variable concept is implemented on top of the actor model to grant uniform and easy access to global states and values by using the internal mechanisms of the actor model. Communication via an asynchronous messaging interface reduces component coupling. The scalability of the actor model provides a uniform concurrency paradigm on different levels of granularity as well as exchangeability of architectural elements and components.

2 Gameplay

A group of ghosts is trying to destroy the village's bridge. To accomplish their mission they will pile up exploding barrels there. As those barrels are found in different places all over the town, the ghosts have to first locate them before they can carry them to the bridge.

The user takes the role of a wizard who has to prevent the ghosts from accomplishing their evil endeavor. The wizard is a master of spells: ice balls, fire balls and shields will teach the ghosts to respect the forces of light and to desist from their plan. Whereas the first two spells are used to take out, respectively slow down the ghosts, the shield spell creates a magic aura around the wizard which prevents the ghosts from approaching the wizard too close. The wizard may destroy the barrels with fire balls before they are taken to the bridge. Or he/she may try to stop the ghosts before they reach the bridge. On the other hand, the ghosts will win if they manage to reach their goal by destroying the bridge or beating up the wizard.

Approaching a ghost that is currently not carrying a barrel will result in an attack, reducing the wizard's health points if not avoided by a fast counterattack. Furthermore, casting spells does consume mana, which forces the wizard to recover at the well located at the village's center.

3 Interaction

The user can walk around in the village using the d-pad of a Nintendo Wii Remote. To cast spells the user has to master the spells' secrets. Every spell has a magic phrase associated with a specific gesture sequence, all integrated by the multi-modal interaction component. For example, a fire ball is casted by uttering the phrase *fire* and clasping the hands followed by a push gesture.

4 Setup

The minimal hardware setup for the demo requires a 6DOF tracking system (> 2 rigid bodies), at least one computer (coarse grained distribution for some parts is already supported), and one video projector. The tracking system provides the users' head and hand positions via VRPN. The same protocol is used for the Nintendo Wii Remote connected via bluetooth. The speech and gesture recognition systems are loosely coupled using telnet. Simulator X and hence the *SiXton's Curse* application itself run on a state of the art Windows, Mac or Linux desktop computer with at least one dedicated graphics card. The graphical output is passed to one or multiple HD video projectors.

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5 Intelligent Graphics Lab Bayreuth

The lab is one of the two participating partners in the SIRIS project (Semantic Reflection for Realtime Interactive Systems), the home of the Simulator X development and the *SiXton's Curse* application. Founded in 2009 by Prof. Latoschik, the Intelligent Graphics Group is located at the University of Bayreuth, Germany.

5.1 Mission

The Intelligent Graphics Group explores novel forms of human-computer interaction making interactive media the heart of the user interface. The group's research aims at the integration and utilization of concepts, methods, and techniques from Computer Graphics and Artificial Intelligence.

5.2 Research Topics

The research topics of the Intelligent Graphics Group range from intelligent virtual and augmented environments, agent based interaction and multimodal interfaces, to semantic modeling, system engineering, and ontologies for interactive systems.

5.3 Environment

The Intelligent Graphics Lab provides a variety of hard- and software systems required to fulfill its mission. This includes several computing and rendering facilities, tracking systems, multi-screen setups as well as large-screen projection devices.

6 Computer Graphics and Interactive Media Lab Berlin

The other SIRIS research team is located at the Beuth University of Applied Sciences in Berlin in the *Computer Graphics and Interactive Media Lab*. The team, lead by Prof. Tramberend, focuses its work on software architectures for immersive Virtual Environments.

6.1 Research Topics

Major research topics of the group are scalability in distributed and networked environments and the possible impact of modern programming language paradigms on software technology. A specific application area is the design of middelware APIs for interactive graphics applications.

6.2 Environment

The lab operates a variety of immersive in- and output devices and associated rendering hardware. A stereoscopic back-projection system is currently used to validate the Simulator X prototype designs.

References

[1] C. Hewitt, P. Bishop, and R. Steiger. A universal modular ACTOR formalism for artificial intelligence. In *IJCAI'73: Proceedings of the 3rd international joint conference on Artificial intelligence*, pages 235–245, San Francisco, CA, USA, 1973. Morgan Kaufmann Publishers Inc.

[2] M. E. Latoschik and H. Tramberend. Simulator X: A Scalable and Concurrent Software Platform for Intelligent Realtime Interactive Systems. In *Proceedings of the IEEE VR 2011*, 2011.